Jared F. Miller

Convex Optimization · Nonlinear Systems · Control

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Education

Northeastern University

Boston, MA, USA

Ph.D. in Electrical and Computer Engineering *Sept. 2018 - May 2023*

- Communications, Control, and Signal Processing (CCSP)
- Advised by Prof. Mario Sznaier
- Thesis Title: "Safety Quantification for Nonlinear and Time-Delay Systems using Occupation Measures" [link]
- Thesis Committee: Octavia Camps, Didier Henrion (LAAS-CNRS), Bahram Shafai, Eduardo Sontag, Mario Sznaier
- GPA: 4.0 (4.0 Scale)

M.S. in Electrical and Computer Engineering *Sept. 2015 - May 2018*

- Communications, Control, and Signal Processing (CCSP)
- GPA: 3.852 (4.0 Scale)

B.S. in Electrical Engineering *Sept. 2013 - May 2018*

- Minor in Mathematics
- GPA: 3.865 (4.0 Scale), Summa cum Laude

Research Publications

Journal Papers (published)

1. Jared Miller and Mario Sznaier. Bounding the Distance to Unsafe Sets with Convex Optimization. *IEEE Transactions on Automatic Control*, pages 1–15, 2023. [link] (Early Access)
2. Jian Zheng, Tianyu Dai, Jared Miller, and Mario Sznaier. Robust Data-Driven Safe Control using Density Functions. *IEEE Control Systems Letters*, 7:2611–2616, 2023. [link] (LCSS-CDC)
3. Jared Miller and Mario Sznaier. Data-Driven Gain Scheduling Control of Linear Parameter-Varying Systems using Quadratic Matrix Inequalities. *IEEE Control Systems Letters*, 7:835–840, 2022. [link] (LCSS-ACC)
4. Jared Miller, Yang Zheng, Mario Sznaier, and Antonis Papachristodoulou. Decomposed structured subsets for semidefinite and sum-of-squares optimization. *Automatica*, 137:110–125, 2022. [link]
5. J. Miller, D. Henrion, and M. Sznaier. Peak Estimation Recovery and Safety Analysis. *IEEE Control Systems Letters*, 5(6):1982–1987, 2021. [link] (LCSS-ACC)
6. Jared Miller, Muhammad Ali Al-Radhawi, and Eduardo Daniel Sontag. Mediating Ribosomal Competition by Splitting Pools. *IEEE Control Systems Letters*, 5(5):1555–1560, 2021. [link] (LCSS-ACC)

Journal Papers (submitted)

1. Jared Miller, Tianyu Dai, and Mario Sznaier. Data-Driven Stabilizing and Robust Control of Discrete-Time Linear Systems with Error in Variables, 2023. [link]

Conference Proceedings (published)

1. Jared Miller and Mario Sznaier. Bounding the Distance of Closest Approach to Unsafe Sets with Occupation Measures. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 5008–5013, 2022. [link]
2. Jared Miller, Tianyu Dai, and Mario Sznaier. Data-Driven Superstabilizing Control of Error-in-Variables Discrete-Time Linear Systems. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 4924–4929, 2022. [link] (Outstanding Student Paper Award)
3. Filip Bečanović, Jared Miller, Vincent Bonnet, Kosta Jovanović, and Samer Mohammed. Assessing the Quality of a Set of Basis Functions for Inverse Optimal Control via Projection onto Global Minimizers. In *2022 IEEE 61st Conference on Decision and Control (CDC)*, pages 7598–7605, 2022. [link]
4. Jared Miller and Mario Sznaier. Facial Input Decompositions for Robust Peak Estimation under Polyhedral Uncertainty. *IFAC-PapersOnLine*, 55(25):55–60, 2022. [link] (IFAC Young Author Award)
5. Jared Miller, Didier Henrion, Mario Sznaier, and Milan Korda. Peak Estimation for Uncertain and Switched Systems. In *2021 60th IEEE Conference on Decision and Control (CDC)*, pages 3222–3228, 2021. [link] (Outstanding Student Paper Award)
6. J. Miller, R. Singh, and M. Sznaier. MIMO System Identification by Randomized Active-Set Methods. In *2020 59th IEEE Conference on Decision and Control (CDC)*, pages 2246–2251, 2020. [link]
7. Jared Miller, Yang Zheng, Mario Sznaier, and Antonis Papachristodoulou. Decomposed Structured Subsets for Semidefinite Optimization. In *2020 21st IFAC World Congress*, 2020. [link]
8. Chieh Wu, Jared Miller, Yale Chang, Mario Sznaier, and Jennifer Dy. Solving Interpretable Kernel Dimensionality Reduction. In H. Wallach, H. Larochelle, A. Beygelzimer, F. d'Alché-Buc, E. Fox, and R. Garnett, editors, *Advances in Neural Information Processing Systems*, volume 32, pages 7915–7925. Curran Associates, Inc., 2019. [link] (acceptance rate 21.9%)
9. J. Miller, Y. Zheng, B. Roig-Solvas, M. Sznaier, and A. Papachristodoulou. Chordal Decomposition in Rank Minimized Semidefinite Programs with Applications to Subspace Clustering. In *2019 IEEE 58th Conference on Decision and Control (CDC)*, pages 4916–4921, 2019. [link]

Conference Proceedings (published)

10. J. Miller and B. Shafai. A Model of Heave Dynamics for Bagged Air Cushioned Vehicles. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 976–981, 2019. [link]
11. B. Taskazan, J. Miller, U. Inyang-Udoh, O. Camps, and M. Sznaier. Domain Adaptation Based Fault Detection in Label Imbalanced Cyberphysical Systems. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 142–147, 2019. [link]

Conference Proceedings (accepted but not yet published)

1. Jared Miller, Tianyu Dai, and Mario Sznaier. Superstabilizing Control of Discrete-Time ARX Models under Error in Variables. In *22nd IFAC World Congress*, 2023. [link] (Finalist for IFAC Young Author Award)
2. Jared Miller, Matteo Tacchi, Mario Sznaier, and Ashkan Jasour. Peak Value-at-Risk Estimation for Stochastic Differential Equations using Occupation Measures. In *62nd IEEE Conference on Decision and Control*, 2023. [link]
3. Jared Miller, Tianyu Dai, Mario Sznaier, and Bahram Shafai. Data-Driven Control of Positive Linear Systems using Linear Programming. In *62nd IEEE Conference on Decision and Control*, 2023. [link]
4. Jared Miller, Milan Korda, Victor Magron, and Mario Sznaier. Peak Estimation of Time Delay Systems using Occupation Measures. In *62nd IEEE Conference on Decision and Control*, 2023. [link]

Conference Proceedings (submitted)

1. Jared Miller, Jian Zheng, Mario Sznaier, and Chris Hixenbaugh. Data-Driven Superstabilization of Linear Systems under Quantization, 2023. [link]
2. Jared Miller and Roy Smith. Peak Estimation of Rational Systems using Convex Optimization, 2023. [link]

Preprints

1. Jared Miller and Mario Sznaier. Quantifying the Safety of Trajectories using Peak-Minimizing Control, 2023. [link]
2. Jared Miller and Mario Sznaier. Analysis and Control of Input-Affine Dynamical Systems using Infinite-Dimensional Robust Counterparts, 2023. [link]
3. Jared Miller and Mario Sznaier. Peak Estimation of Hybrid Systems with Convex Optimization, 2023. [link]

Seminars

1. "Data-Driven Safety Quantification using Robust Optimization," October 18, 2023, Cybernetic Systems and Controls Lab (CSCL), Arizona State University, Tempe, AZ. [link].
2. "Risk analysis for stochastic processes using polynomial optimization," October 15-18, 2023, Convex Relaxations for Polynomial Optimization, INFORMS Annual Meeting, Phoenix, AZ [link].
3. "Data-Driven Safety Quantification using Robust Optimization," October 11, 2023, Safe Autonomy and Intelligent Distributed Systems (SAIDS) group, University of Southern California, Los Angeles, CA. [link]
4. "Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization," July 27, 2023, Konstanz Real Algebraic Geometry Seminar, University of Konstanz. [link]
5. "Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization," May 29, 2023, Student Seminar Series on Optimization, Control & Learning, UC San Diego. [link]
6. "Quantifying Safety under Uncertainty using Occupation Measures," May 26, 2023, Control Seminars @ UCI, UC Irvine
7. "Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization", May 19, 2023, Multi-Robot Systems Lab Meeting, Stanford University. [link]
8. "Analysis and Control of Time-Delay Systems Using Polynomial Optimization", May 14, 2023, MS14 Studying Dynamics using Polynomial Optimization Tools, SIAM Conference on Dynamical Systems. [link]
9. "Data-Driven Control under Input and Measurement Noise", April 9, 2023, Oden Institute Seminar, UT Austin. [link]
10. "Safety Analysis for Nonlinear and Time-Delay Systems using Occupation Measures", April 3, 2023, PhD Thesis Defense, Northeastern University. [link].
11. "Data-Driven Control under Input and Measurement Noise", NYU MERIIT Lab Seminar Series, New York City, Feb 21, 2023. [link]
12. "Bounding the Distance to Unsafe Sets with Convex Optimization", DCSD Rising Stars, 2nd Modeling, Estimation and Control Conference, Jersey City, October 2-5 2022. [link]
13. Tutorials about Convexity, Interior Point Methods, Frank-Wolfe algorithms (with applications to system identification), and Polynomial Optimization, June 27, 2022, From Data to Control, Israeli Association of Automatic Control (with M. Sznaier). [link]
14. "Bounding distances to unsafe sets", June 16, 2022, IfA Coffee Talks, ETH Zurich. [link]
15. "Bounding distances to unsafe sets", June 14, 2022, LA3 Meeting, EPFL Lausanne. [link]
16. "Bounding distances to unsafe sets", June 3, 2022, Journées SMAI MODE, University of Limoges (XLIM). [link]
17. Tutorials about Interior Point Methods, Polynomial Optimization, Frank-Wolfe algorithms and variations, and SDP approximations, May 16-20, Sparsity and Big Data in Control, Systems Identification, and Machine Learning, European Embedded Control Institute.
18. "Bounding distances to unsafe sets", April 14, 2022, Conic Linear Optimization for Computer-Assisted Proofs, Mathematisches Forschungsinstitut Oberwolfach (MFO). [link]
19. "Bounding distances to unsafe sets", June 28, 2021, Brainstorming days on measure and polynomial optimization (BrainPOP), LAAS-CNRS. [link]
20. "Data-Driven Peak and Reachability Set Estimation", May 25, 2021, MS112 Methods of Learning Dynamical Systems for Control, SIAM Conference on Dynamical Systems. [link]
21. "Analysis and Control of Time-Delay Systems with Occupation Measures", May 3, 2021, BrainPOP, LAAS-CNRS. Work not yet published, in preparation. [link]
22. "Exploiting Structure in Rank-Constrained and Approximated Semidefinite Programs", December 19, 2019, TISEM Operations Research Seminar, Tilburg University. [link]

Poster Sessions (without Conference Proceedings)

1. "Risk Analysis of Stochastic Processes using Polynomial Optimization." November 13, 2023, Future Trends in Polynomial Optimization, LAAS-CNRS, Toulouse, FR. [link]
2. "Frequency Domain Identification via Sum-of-Rational Optimization." September 25, 2023, European Research Network System Identification (ERNSI), Stockholm, SE. [link]
3. "Safety Analysis and Control using Measures." April 13, 2023, RISE 2023, Northeastern University. [link]
4. "Safety Analysis and Control using Measures." February 27, 2023, PhD Research Expo, Northeastern University. [link]
5. "Diameter Constrained Minimum Spanning Graphs." January 31, 2023, Current Themes of Discrete Optimization: Boot-camp for early-career researchers, ICERM. [link]
6. "Safety Analysis using Distance Estimation and Measures." August 24, 2022. CLEVR-AI MURI Yearly Review Meeting, Northeastern University. [link]
7. "Exploiting SDP Structure Yields Tighter Approximations." April 9, 2020. RISE, Northeastern University (remote). [link]
8. "Exploiting SDP Structure Yields Tighter Approximations." February 24, 2020. IPAM Control, Learning and Optimization workshop, University of California, Los Angeles. [link]
9. "Chordal Decompositions in Rank Minimized SDPs." May 30-31, 2019. Learning for Decision and Control (L4DC), Massachusetts Institute of Technology. [link]
10. "Chordal Decompositions in Rank Minimized SDPs." May 10, 2019. New England Machine Learning Day, Northeastern University. [link]
11. "Scattered data interpolation through B-spline wavelets and the Elastic Net." April 14, 2017. RISE, Northeastern University. [link]
12. "A parallelized Python-based Multi-Point Thomson Scattering analysis in NSTX-U." October 29, 2014. 56th Annual APS Plasma Physics Conference, New Orleans. [link]

Experience

ETH Zürich — *Zürich, CH*
Postdoctoral Researcher, Automatic Control Lab (IfA), Forschungsgruppe Prof. Roy Smith — *August 2023 - Present*

Northeastern University — *Boston, MA, USA*
Postdoctoral Researcher, Robust Systems Lab, Controls Group — *May 2023 - July 2023*

Northeastern University — *Boston, MA, USA*
Research Assistant, Robust Systems Lab, Controls Group — *Jul. 2017 - April 2023*

Laboratory for Analysis and Architecture of Systems (LAAS-CNRS) — *Toulouse, FR*
Chateaubriand Fellow, Decision and Optimization, Methods and Algorithms in Control (MAC) Team — *Jan. 2022 - Jul. 2022*

Paradigm Hyperloop — *Boston, MA, USA*
Control Theorist, Levitation Group — *Jul. 2017 - Dec. 2017*

ASML Holding — *Veldhoven, NL*
Co-op, Metrology Group — *Mar. 2016 - Aug. 2016*

Advanced Micro Devices (AMD) — *Boxborough, MA, USA*
Co-op, Shader Compiler Group — *Jan. 2015 - Jun. 2015*

Princeton Plasma Physics Laboratory (PPPL) — *Plainsboro Township, NJ, USA*
Intern/Part-time Contractor, Data Visualization Group — *Sep. 2012 - Feb. 2016*

Cornell High Energy Synchrotron Source (CHESS) — *Ithaca, NY, USA*
Summer Intern/Research Assistant — *Jul. 2012 - Aug. 2012*

Teaching

ETH Zürich — *Zürich, CH*
Teaching Assistant — *Fall 2023*

- System Identification (227-0689)

Northeastern University *Boston, MA, USA*

Teaching Assistant *Fall 2022*

- EECE 5644: Machine Learning and Pattern Recognition

Teaching Assistant *Fall 2021*

- EECE 7345: Big Data, Sparsity, and Control

European Embedded Control Institute *Toulouse, FR*

Teaching Assistant *May 16-20, 2022*

- Sparsity and Big Data in Control, Systems Identification and Machine Learning

Honors & Awards

Jul. 2023	**Finalist for Young Author Award,** 2023 IFAC World Congress	*Yokohama, JP*
Jun. 2023	**Travel Award,** 2023 American Control Conference (ACC)	*San Diego, CA*
Apr. 2023	**ECE Excellence in Research Award,** Northeastern University College of Engineering	*Boston, MA*
Jan. 2023	**Travel Award,** ICERM workshop: Current Themes of Discrete Optimization	*Providence, RI*
Dec. 2022	**Outstanding Student Paper Award,** 2022 61st IEEE Conference on Decision and Control	*Cancún, MX*
Dec. 2022	**Travel Award,** 2022 61st IEEE Conference on Decision and Control	*Cancún, MX*
Oct. 2022	**ASME DSCD Rising Star Award,** MECC 2022 (IFAC)	*Jersey City, NJ, USA*
Sep. 2022	**IFAC Young Author Award,** ROCOND 2022 (IFAC)	*Kyoto, JP (remote)*
Apr. 2022	**Travel Award,** MFO: Conic Linear Optimization for Computer-Assisted Proofs	*Oberwolfach, DE*
Jan. 2022	**Travel Award (for Toulouse),** AFOSR FY22 International Student Exchange Program (ISEP)	*Arvada, CO, USA*
Dec. 2021	**Outstanding Student Paper Award,** 2021 60th Conference on Decision and Control	*Austin, TX, USA*
Apr. 2020	**Chateaubriand Fellowship,** Office of Science and Technology, Embassy of France in the USA	*Toulouse, FR*
Feb. 2020	**Hosting,** IPAM: Intersections between Control, Learning and Optimization (UCLA Workshop)	*LA, CA, USA*
Dec. 2019	**Travel Award for Seminar,** TISEM Seminar at Tilburg University	*Tilburg, NL*
Aug. 2019	**Travel Award,** 2019 IEEE Conference on Control Technology and Applications (CCTA)	*Hong Kong*
2013-2018	**Honors Program,** Northeastern University	*Boston, MA, USA*
2015-2018	**Dean's List,** Northeastern University	*Boston, MA, USA*

Skills

Programming Matlab (incl. Simulink), Python, Mathematica, LaTeX, Julia, C/C++

MS Office Word, Excel, PowerPoint, Publisher

Professional Organizations

Institute of Electrical and Electronics Engineers (IEEE)

(Member *Sept. 2013 - Present*

IEEE Eta Kappa Nu (HKN)

Member, Tutor *Sept. 2014 - Present*

Society for Industrial and Applied Mathematics

Member *Oct. 2019 - Present*

IEEE CSS Technical Committee on Robust and Complex Systems (TC-RoCS)

Member *Sept. 2022 - Present*

IEEE CSS Technical Committee on Hybrid Systems

Member *Jun. 2023 - Present*

IFAC Technical Committee 2.5 Robust Control

Member *Sept. 2022 - Present*

INFORMS

Member *June 2023 - Present*

Professional Service

Reviewer

Automatica, IEEE Transactions on Automatic Control (TAC), IEEE Control Systems Letters (L-CSS), Learning for Dynamics & Control Conference (L4DC), IFAC Symposium on Robust Control Design (ROCOND), IEEE Conference on Decision and Control (CDC), European Control Conference (ECC), Nonlinear Analysis: Hybrid Systems, Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences; Kybernetica, Association for the Advancement of Artificial Intelligence (AAAI)